THE

VETERINARY JOURNAL

Editor :
FREDERICK HOBDAY, C.M.G., F.R.C.V.S., F.R.S.E.,
HONORARY VETERINARY SURGEON TO HIS MAJESTY THE KING.
OFFICIER DU MERITE AGRICOLE (FRANCE).
CAVALIERE DEI S. S. MAURIZIO E LAZZARO (ITALY).
HONORARY MEMBER OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION.
AND FORMERLY PROFESSOR IN THE ROYAL VETERINARY COLLEGE, LONDON.

Sub-Editor :
GLADSTONE MAYALL, M.R.C.V.S.

APRIL, 1922.

Obituary.

THE LATE MR. S. J. MARRIOTT, M.R.C.V.S.

FEW veterinary practitioners in the Midlands could claim greater popularity, either with their *clientèle* or brother practitioners, than Mr. Samuel James Marriott, and his genial manner and professional skill had gained him a big and busy practice. Taking his diploma in 1883 at the London College he settled down in Northampton, in which town he held a number of public appointments. He was Veterinary Inspector to the County Borough, Veterinary Adviser to the Police, County Court Assessor, and Lecturer in Veterinary Science to the County Council.

A life member of the Northamptonshire Agricultural Society, he took a prominent part in all matters pertaining to the welfare of stock and agriculture, and his death at the comparatively early age of 60 leaves a gap which will be difficult to fill.

Fortunately he had had the pleasure of seeing his sons grow up, two of them following in his footsteps with creditable careers, one of them (Capt. S. W. Marriott, R.A.V.C.) receiving the Order of the British Empire for distinguished services during the war, and another (Mr. T. G. Marriott, M.R.C.V.S.), who also " did his bit " in the Flying Corps, had just settled down in partnership a short time before the sad event occurred.

The sympathies of Mr. Marriott's many friends in the profession will go forth to his widow and family.

Editorials.

REPORT OF THE ADVISORY COMMITTEE ON RESEARCH INTO DISEASES OF ANIMALS.

THIS report, which can be obtained from His Majesty's Stationery Office or through any bookseller for the small sum of 1s. 6d., should be read in full by everyone, whether student or practitioner, in the Veterinary Profession.

The Committee, which included the names of Sir John McFadyean and Principal Bradley from our own profession, was originally formed in November, 1920, "to report on the facilities now available for the scientific study of the diseases of animals, to indicate what extension of those facilities is desirable in the immediate future in order to advance the study of disease whether in animals or man, and to advise as to the steps which should be taken to secure the aid of competent scientific workers in investigating diseases in animals."

The report which has been issued illustrates in a very striking manner the uphill fight which the veterinary profession has always had to make in the face of the meagre and miserly support rendered to it by the Government. This amounted pecuniarily in 1920-21 to a beggarly, miserable, pittance of only £3,696 allotted for research purposes; and this in a country to which every part of the world comes for its best pedigree stock and whose name is world-wide. Truly do the Committee term this apathetic lack of support "a national disgrace"! No wonder we continually bewail the lack of research scholarships and other opportunities for our young graduates! It seems incredible that Great Britain, the richest, most humane, and most animal-loving country in the world, should lag so far behind other countries in its Governmental appreciation of what veterinary science does for the economic and practical value of agriculture, and, through it, of the whole community at large. Neither this country nor any other could exist without the continuance and prosperity of its livestock, and we as veterinarians are absolutely essential for the maintenance of these animals in a state of health and the prevention of those scourges of disease which, if unchecked, so rapidly spread and leave behind them death, desolation, and ruin.

Each branch of the veterinary profession is essential to the other, whether a man be a practitioner or a worker in a laboratory; and whether one looks back on the past or considers the present, we really may be excused for rendering a word of praise to those who have given their lives (and still give their lives) unselfishly, and without adequate reward, in the fight against the diseases of animals—many of the latter

of which, when overcome, lessen the number of those which our colleagues in human medicine have to circumvent and overcome. Compare the facilities in Great Britain with those offered to our European and American *confrères* in veterinary research, and the two cannot be mentioned in the same breath. Germany, France, Italy, Holland, Denmark, Sweden, Holland, Belgium, and indeed all of the civilised European countries, allot large sums for the establishment and maintenance of their veterinary schools and animal research laboratories, sums beside which our own £3,000 odd per annum becomes a miserable pittance, or, as the Committee sarcastically, but truthfully, terms it, "a national disgrace."

It is, indeed, a standing disgrace, for the avoidable economic pecuniary loss to stockowners in a single year would support a number of research institutes many times over, and make the positions attached to them of sufficient value to attract the best men and obtain the best brains, and keep them there to work out their theories for the national welfare. State aid is necessary, and private aid, although praiseworthy, should only be looked upon as an adjunct. It is to be hoped that as the result of this report some tangible action will be taken, and that public money, so often frittered away on useless objects, will be turned in the direction of Research on the Diseases of Animals. This is the chief thing wanted for the raising of the profession to its proper position amongst the scientific and learned professions, and when once *un fait accompli*, the result will follow, for we have the men who possess the brains and only await the opportunity to use them.

Let each of us spend the 1s. 6d. necessary for the purchase of the pamphlet—the study of the evidence will give hours of thought—and show that, in theory at all events, we are appreciated, and that we must "strike whilst the iron is hot" in every possible way within our command, to influence those with whom we come in contact to support the recommendations of the Advisory Committee in their assertion that it is time Veterinary Science came into its own.

POULTRY PATHOLOGY.

THE study of the diseases of birds, so much neglected by our profession in the past, is at last being forced upon us, and a review in a further column of two books upon the anatomy and diseases (respectively) of the common fowl, each by Professor Kaupp, an American author, is well worth consideration and close perusal. All animals and birds, when sick, come into the legitimate sphere of the trained

veterinarian, and it is up to us to be cognisant of their ailments and their remedies. Individual birds may be of comparatively little value and not worth attendance, but in certain districts large poultry farms exist and the aggregate values of their stock run into large sums of money—besides which there is the feeling that " we ought to know." The scientific treatment of all animal and bird diseases is a veterinary matter, and if we neglect it the distracted owner has a right to seek outside aid, and thus we lose an opportunity. Many of our lost opportunities are through our own fault, and in these days of revolutionised methods of practice and diminishing patients, nothing which legitimately belongs to us must be relinquished; the study of the diseases of the bird should occupy as honoured a place in our college curriculum as that of the diseases of any other of our legitimate patients.

General Articles.

THE WORK OF THE STATE VETERINARY-BACTERIOLOGICAL INSTITUTE OF SWEDEN DURING THE FIRST DECADE OF ITS EXISTENCE.*

THE King-in-Council and the Riksdag having determined, on June 17, 1908, the establishment, on the Extraordinary Budget, of a Veterinary-Bacteriological Institute, the Instructions for the Institute were confirmed on October 2, 1908. Although the Institute is not subordinate to the Veterinary High School, but to the Royal Medical Board, and although its budget is separate from that of the said High School, economy led to the Institute being lodged on the premises of the High School.

The scientifically trained staff consisted during the first five years of the Principal and a laborator alone. The total grant for 1911 was 22,000 Swedish Crowns (£1,230). During the next few years the grant was increased a little. In 1914 the Royal Medical Board applied to the Government in order to have the expenses of the Institute paid out of the Ordinary Budget, stating, *inter alia*, in its application as follows: " The experience gained during the period that has elapsed since the starting of the Institute in 1911 has undisputably demonstrated that the establishment fills a real need. Its activity has steadily increased during the past years, and the results have been successful. Everything points to this Institute now being absolutely indispensable to its purpose, so that there should exist no doubt as to the suitability of giving it a more stable form by placing it on the Ordinary Budget." The application was granted the following year by the King-in-Council

* Abstract of a translated Report sent by the Consul-General for Sweden.

and the Riksdag, and the annual grant was fixed at 42,700 Swedish Crowns (£2,900), of which sum 18,400 Crowns (£1,020) was assigned to salaries and fees. A new assistantship was established at the same time.

In March, 1915, the post of Director became vacant. In consequence of the low salary no competent applicant appeared when the position was declared vacant, and a temporary assistant had to be engaged until the close of 1919, this, of course, causing serious inconvenience.

New tasks continually arose for the Institute, however, and its activity increased rapidly, so that the staff soon proved quite insufficient. Temporary relief in this respect was gained by the appointment of extra assistants and by the voting of additional grants for 1918 and 1919. The Government laid before the Riksdag of 1919 a Bill for an increased grant from the Ordinary Budget for the State Veterinary Bacteriological Institute. The Bill was passed by the Riksdag on June 11, and came into operation from the beginning of 1920. This signifies a great advance for the Institute. The ordinary annual grant was increased to 77,000 Crowns (£4,000). The laborator's salary was increased, the permanent staff was increased by the appointment of a Director, an assistant, a serum controller, a stable foreman, a first caretaker, and two women assistants. The laboratory work proper was divided into two departments : one diagnostic, chiefly for bacteriological and pathologic-anatomical work ; and the other a serological, mainly for sero-diagnostical investigations and the production of tuberculin, mallein, sera and vaccines.

The work that was first begun consisted *of diagnostical investigations of bacteriological and pathologic-anatomical nature.* As a rule, these concern cases of diseases that are suspected to be infectious. The material is sent in by veterinary surgeons or cattle owners. The number of such investigations has increased fairly evenly year by year, from 480 in 1912 to 1,551 in 1920.

When cows are suspected of being attacked by *tuberculosis of the udder,* veterinary surgeons and cattle owners are bound to send milk samples from the animals in question to the State Veterinary-Bacteriological Institute to be tested for tubercle bacilli. If such bacilli are discovered in the milk the fact is reported to the Royal Medical Board : the cows are slaughtered and the owner is indemnified by compensation made by the State. More than 1,200 such investigations, not included in those above-mentioned, were made in 1911. During the Great War the number of yearly testings for tuberculosis of the udder fell to 341 in 1918, from which date it again began to rise, reaching 590 in 1920.

A Royal Proclamation of February 22, 1916, orders all horses and asses imported into Sweden to be examined, while they are in quarantine establishments, by means of ophthalmic mallein test, in addition to which a blood-sample has to be taken from the horses for *serological examination for glanders* at the State Veterinary-Bacteriological Institute. The plan of this work has been drawn up in detail at the Institute. The production of mallein and antigen for serological glanders diagnostic had been begun the year before. In the serological investigations there are employed in every instance both the agglutination and the fixation of complement tests, or, instead of the latter, the conglutination test, when the sera themselves fix the complement, as is usually the case with sera from asses. These examinations began in March, 1916, during which year 438 blood samples were sent to the Institute. In consequence of the increase in the number of horses imported the number of such blood-tests yearly has since increased. During 1920 there were 2,347 samples examined in the manner just described.

Serological examinations by means of agglutination and fixation of complement have been employed since 1912 *for diagnosing infectious abortion in cows*. The number of such blood-samples tested has risen to 791 in 1920. The intention has not been, in carrying out this work, to discover, by means of the examination of entire herds, the animals that can be suspected of being infected, in order, guided by this, to take measures to prevent the spread of the infection. The practical difficulties in the way of doing this have proved to be too great, so that the only aim has been to be able to state whether the abortion appearing in any certain herd has been occasioned by Bang's abortion bacillus or not, and for this purpose it has proved sufficient to examine blood-samples from a few animals. The number given for 1920, therefore, represents the investigations made in the case of a couple of hundred herds of cattle.

In connection with the above-mentioned examinations, there began in 1915 experimental *vaccination for infectious abortion in cattle* in accordance with a method elaborated at the State Veterinary-Bacteriological Institute. The vaccine was distributed for two years free of cost. The results obtained were promising. From 1917 the demand for "abortion-vaccine" became more and more lively, and during 1920 vaccine was supplied for about 10,000 animals. After vaccination in infected herds only about 10 per cent. of the cows have aborted.

In consequence of representations from the Agricultural Society of the Province of Norrbotten, comprehensive and systematic measures have been taken since the autumn of 1917, under the direction of the

State Veterinary-Bacteriological Institute and with the support of State grants for combating infectious abortion of cattle in the said province. The measures have consisted in discovering the infected herds by means of serological examinations, and in vaccination and disinfection, together with instructive lectures on the subject in various parts of the province. The disease, which was widely prevalent when this work began, has since decreased most essentially.

At the beginning of 1920 there was found, on examination at the Institute, *infectious abortion in horses, caused by paratyphus bacilli* existing in Skaraborg province, one of the most successful horse-breeding districts of Sweden. The disease had spread very extensively, but vigorous measures were taken, in accordance with a plan elaborated at the Institute, for confining the outbreak within the strictest limits possible, and this with success. The struggle against the disease has consisted chiefly of serological examinations in infected and suspected herds. No less than 4,618 blood samples were tested during 1920, and 262 herds had to be considered as infected by paratyphus-abortion. Polyvalent paratyphus vaccine has been produced and also employed. The result of this vaccination cannot be judged of until the close of the present foaling period.

Autogenous vaccine has been produced in increasing quantity since 1917 for use in local morbid processes, especially in skin diseases caused by strepto- and staphylococci. In most instances the result has been extremely satisfactory.

The *production of serum* began in 1912, on a very small scale. It was coli-, paracoli- and pyogenes sera that were made for prophylactic purposes in certain diseases of calves. In 1914 the list was increased by serum against swine erysipelas ; in 1916 pasteurella sera against swine-plague and septic pneumonia in calves, and antistreptococcic serum against strangles ; in 1917, serum against the infection of wounds caused by strepto- or staphylococci, and, in 1918, petechial fever serum. The sera that have been most in demand are those against swine erysipelas and wound infections. All supplies of serum are dispatched after application from a veterinary surgeon and, as a rule, they are sent direct to the estate where it is to be used. In 1914 the total amount sent was 32,465 cub. cm. sera. Four years later, or in 1918, the corresponding quantity was 324,072 cub. cm., *i.e.*, ten times the amount first-mentioned, and, in 1920, or only two years later, the supply of serum sent was 740,899 cub. cm., *i.e.*, twenty-three times more than six years previously.

In 1920 there was sent to the Board of Agriculture a total of 35,000 cub. cm. tuberculin.

According to the instructions governing the work of the Institute,

the establishment has also " by means of well-planned and carefully carried out experiments—not only at the Institute, but also in collaboration with practical farmers—to endeavour to gain an insight into those methods that should be adopted in order to carry on the struggle against the different cattle diseases with the greatest prospect of success." Among the more comprehensive of such experiments which have not been spoken of above, mention may be made of the investigations respecting infectious anæmia in horses, malignant catarrhal fever in cattle, and infectious sheep diseases introduced into Sweden by means of the import of breed animals during 1919. In consequence of an application made by the Kristianstad Provincial Association for combating cattle tuberculosis, the Institute has undertaken, since 1912, on certain conditions, to carry out the microscopical examinations and the experimental inoculations necessary for the Association's endeavours to combat tuberculosis, guided by clinic-bacteriological diagnoses.

The Institute's officials have also carried on *educational work*. The Principal, by special instructions of the Royal Medical Board, gave lectures in 1913 on bacteriology and serology to older veterinary surgeons ; gave instruction in the same subjects in 1912, 1916 and 1920, during the training courses for candidates for the post of provincial veterinary surgeons, and, in accordance with the instructions of the Medical Board of the Royal Military Administration, taught the theory of epizootics, bacteriology, etc., at the training courses for battalion veterinary surgeons in 1918 and 1919. The instruction in bacteriology for students at the Veterinary High School has been given by a laborator of the Institute. As the establishment has no premises for teaching purposes, all the courses have been given in the pathological-anatomical section of the Veterinary High School. Veterinary surgeon candidates, two at a time, have been given the opportunity, for short periods, to assist in the laboratory work. Information respecting the work carried out by the Institute has been spread by means of lectures at congresses, meetings of veterinary associations, and on similar occasions.

Publications have been issued in three series : " Annual Reports," and " Communications " (*i.e.*, scientific works of general interest for veterinary surgeons), and " Popular Papers," richly illustrated, intended for distribution on a large scale among the cattle-owning public. By the mediation of the Royal Medical Board, these works have been sent gratis to all veterinary surgeons in the kingdom. In addition, there have been issued several publications which do not form part of the above series. Under more favourable circumstances, the investigation material—which, from a scientific point of view, is

very valuable—could have been utilised better, but, as it is, the scientific work has been restricted by the extremely comprehensive current business. In addition, the establishment was understaffed until 1920, as, in consequence of their low salaries, the laborators and their assistants were unable to remain long at their posts. They have, too, been young veterinary surgeons or veterinary candidates who have had first to be trained at the Institute before they could think of scientific production. For various reasons, however, several rather important investigations have not appeared in print, such as the P. M. of May 13, 1918, to the Swedish Reindeer-grazing Delegation, the origin of which was the proposal made by the Norwegian Reindeer-grazing delegates for a Swedish-Norwegian agreement respecting the measures to be taken on the appearance of infectious diseases among reindeer.

Clinical.

"GRASS DISEASE" AND BOTULISM.*

By J. B. BUXTON, F.R.C.V.S., D.V.H.,
Veterinary Superintendent, Wellcome Physiological Research Laboratories, Langley Court, Beckenham.

"GRASS disease," or "Grass sickness," a now well-known disease of equidæ of certain parts of Northern England and of Scotland, was first investigated in Great Britain by a specially appointed Science Committee of the Highland and Agricultural Society of Scotland in 1918. Time does not permit a detailed description of the symptomatology nor of the lengthy investigation of this Committee before the conclusion was definitely arrived at that the disease was bacterial in origin. It is sufficient to say that the symptoms appear to be identical with those of so-called "forage poisoning" of horses and cattle in America, and that an organism indistinguishable from *B. botulinus* was recovered by Dr. Tocher, of Aberdeen, early in 1919, from obviously diseased portions of intestine and from the spleen of several cases of "Grass disease." At this stage of the investigation I was called in with a view to the elaboration of prophylactic measures.

An attempt was made to devise some means of controlling the incidence of the disease during 1921. It was assumed that the bacteriological findings were of significance, and an endeavour was made to prepare botulinus antitoxin of both types with as little delay as possible.

As will be readily appreciated, the first effort was made with a view to providing a remedial measure rather than to carry out a scientific investigation regarding botulism prophylaxis.

* Read before the Pathological Section of the Royal Society of Medicine, January 17, 1922.

During the season of 1921 the antitoxin was employed chiefly for curative purposes. In view of the very close similarity in action of this toxin as compared with tetanus toxin it was realised that the curative effect of the antitoxin might be no more effective than is that of tetanus antitoxin.

There is, however, ample evidence to hand which shows that even in those cases in which an ultimate recovery did not occur, the acute symptoms of the disease were obviously checked by the intravenous administration of botulinus antitoxin to the patient.

After the 1921 season opportunity naturally occurred to carry out some investigations which might support or destroy the theory of botulism.

Blood was obtained from a chronic case of the disease, and was tested for the presence of traces of botulinus antitoxin with the following result :—

TABLE I.

Toxin.	Serum.		Result.
		1	L
		2	L
	1·0 c.c.	3	L
		4	L
		N	D 48 hours.
		1	L
		2	L
	0·5 c.c	3	L
		4	D
		N	D 48 hours.
Type " A " ...		1	D 48 hours.
2 M.L.D.		2	D 3 days.
	0·1 c.c.	3	L
		4	D
		N	D 48 hours.
		1	D 48 hours.
		2	D 3 days.
	·05 c.c.	3	D 3 days.
		4	D
		N	D 48 hours.
Type " B " ...	Same quantities.		All died.
2 M.L.D.			

From this experiment it was evident that the serum of this chronic case of " Grass disease " contained an appreciable amount of botulinus antitoxin type " A."

Three other samples of serum from recovered cases of the diseases gave similar results.

Since, however, several of these horses had received injections of high value botulinus antitoxin at periods of from seven weeks to several months previous to the experiments, it was possible, although

contrary to usual experience, that sufficient antitoxin remained in the animal to provide these results.

The following experiment was therefore carried out :—

The blood of a normal horse was found, by a similar test, to contain no botulinus antitoxin. Twenty-five cubic centimetres of antitoxin (type "A"), of which ·00005 cc. protected mice against 100 M.L.D. of toxin, was then injected intravenously, and experimental bleedings were taken at intervals of 24, 48 and 72 hours.

It was found that the amount of antitoxin in the blood as the result of an injection of 25 cc. of high value antitoxin is almost undetectable after a short space of time, and that while quantities of more than 1 cc. of such blood will afford some protection to guinea-pigs against 2 M.L.D. of toxin after 48 hours, such protection cannot always be demonstrated after 72 hours, and is never present ten days after the injection of antitoxin.

It has not been possible to detect normal antitoxin in the blood of over forty normal horses. It would therefore appear that chronic cases of "Grass disease" develop a certain degree of active immunity, and that the blood of these animals contains an appreciable amount of antitoxin.

It would appear to be a reasonable assumption that, since botulism in the lower animals is not infrequently due to infection with *B. botulinus* and not to a primary intoxication, there might be some evidence of the presence of agglutinating and complement-binding antibodies in the blood of chronic cases of "Grass disease" and in that of recovered animals.

It has not yet been possible clearly to indicate the presence of agglutinins, but complement binding antibodies were found.

TABLE II.

Serum.	Antigen *B. Botulinus* Type.	Complement Binding Titre of Serum.
Normal	A	Nil.
	B	Nil.
G. 1	A	·05.
	B	·05.
G. 2	A	·05.
	B	·05.
G. 3	A	·01.
	B	·01.
Antitoxin "A" ...	A	Nil.
	B	Nil.
Antitoxin "B" ...	A	Nil.
	B	Nil.
Rabbit 1. ...	A	·05.
Type "B"	B	·01.
Rabbit 2	A	·05.
Type "B" ...	B	·005.
Rabbit	A	Nil.
Normal.	B	Nil.

The test has been carried out with four different samples of serum, and the titre was found to vary from 0·05 cc. to 0·01 cc.

This experiment showed that, while complement-binding antibodies are produced in some, if not all, naturally occurring cases of "Grass sickness," they are not evident in the serum of normal animals or in that of animals which have been immunised with the toxin of *B. botulinus*.

Moreover, while two distinct types of *B. botulinus* may be demonstrated according to the toxin which they produce, this differentiation would appear to be absent in so far as the complement binding antibodies are concerned.

To test this further rabbits were injected intravenously with several doses of young cultures of *B. botulinus* of both types. Those which received type "A" died as a result of the injections. Two, however, which had been injected with type "B" were found to possess complement binding antibodies for both types.

As might be expected, the blood of acute cases of "Grass sickness" did not appear to contain antitoxin or complement binding antibodies.

Attempts are to be made to produce an active immunity by means of toxin antitoxin mixtures on similar lines to those already described in the case of tetanus.

CONCLUSIONS.

(1) It was found that the blood of several horses which had recovered from "Grass disease" contained traces of botulinus antitoxin (type "A"), and that its presence was undetectable in the blood of over forty normal horses which were similarly tested.

(2) That such blood contained complement binding antibodies for *B. botulinus*.

(3) That these antibodies did not show the same specificity for the homologous type as did the antitoxin.

PARTIAL EVERSION OF THE UTERINE HORN IN A MARE.

BY T. G. HEATLEY, O.B.E., F.R.C.V.S.,
Woodbridge.

March 9, 1922.—Whilst visiting an in-foal shire mare, in slings with an open hock joint, the owner said he had had a shire mare at another farm foal the previous day, a fortnight before time, and her temperature last night was 101; he took the temperature because he thought she was a bit dull. I went to the other farm and found the mare dull, not feeding, and temperature 103. When moved, the tail was elevated, a position which I have always noticed to accompany uterine trouble after foaling. I examined the uterus and found that

what had been the gravid cornua was inverted, so that there was a mass as large as a man's head occupying the body of the uterus, with a distinct neck at the point of turning in. The mass was very congested, and bled freely on manipulation, so that there must have been a condition of partial strangulation of the inverted cornua, and the contents of the uterus were thin and lightly blood stained. I douched the uterus with a soapy solution of Bin. Iodide of Mercury, and swabbed out the uterus. In my hands syphoning off the contents has not been successful. I gave adrenalin hypodermically, ordered a simple febrifuge to be given in a pint of oil, and had the mare's shoes removed.

March 10, 1922.—Found the mare showing parturient congestion of the feet. Temperature 102, and feeding rather better. The uterine contents were dark coffee coloured, slightly thicker, but not the chocolate colour I have generally observed in metritis after retention of the after-birth. As the inverted cornua was not so turgid, although still constricted at the neck, I douched the uterus with a similar solution and gave arecoline hypodermically. The front feet were then put in poultices.

March 11, 1922.—The mare was looking altogether brighter and feeding well, and the lameness of the front feet had disappeared. The temperature was only 101. When the patient was moved the elevation of the tail was present in a most marked degree; in fact, she carried it vertically. The uterine contents were still coffee coloured, but not so intense in colour, and somewhat thicker in consistency, this being due to admixture of more mucous. The inverted mass was not quite so voluminous, but not reduced. I douched again, but had no occasion to mop out, as the contents were much clearer.

March 12, 1922.—Mare this morning bright, feeding and moving well, tail carried erect, and temperature 100. The fluid contents of the uterus were still coffee coloured, slightly thicker, and contained floculi. The inverted cornua was somewhat reduced in size, and now about the size of a child's head, like an elongated curved sausage with the great curvature downwards. It was impossible to manipulate it to attempt reduction, as the uterus was so flaccid that it was difficult to detect the fundus with accuracy, the whole surface being corrugated, but with apparently very little tenderness. Douched again, but to-day had to resort to the swabbing. I ordered ten minutes exercise twice daily.

March 13, 1922.—Mare bright, feeding, and temperature normal. On examining the uterus found the inverted cornua restored to its proper position and the uterine fluid contents pretty profuse, but pale

straw colour and much thicker. Decided to see her again in two days' time.

March 15, 1922.—Mare doing well. Temperature normal, and during movement the tail was carried normally. The os uteri was nearly closed, with a little normal, clear mucous present. No further attention was needed, and I ordered half-a-day's work in five days time.

To the student I think there are several interesting points to be drawn attention to, especially the benefits derived from the use of adrenalin and arecoline. The case is interesting also from the difference of opinion expressed by veterinary surgeons as to the benefit or otherwise of uterine douches. I myself should feel I was to blame in a fatal case of metritis where I had not douched.

Also a difference of opinion has been expressed as to whether inversion of the uterus commences at the horn and body of the uterus.

Another point is, that in retention of the after-birth in mares, frequently after removal it is found that the tip of the horn is inverted. Years ago I tried vainly to restore this with a long-necked wine bottle wrapped in a towel, but without success, but now, after coming across many similar conditions, I am of opinion that it is of no consequence, and that there need be no fear that it will lead to an everted uterus.

COLLAPSE BEFORE CALVING.

By W. T. HEWETSON, M.R.C.V.S.,
Brampton, Carlisle.

This last autumn I attended two Galloway cows that were ill and past due to calve. These cows belonged to separate owners, and were ill in the same month when on grass. In both cases the symptoms were similar, and were ushered in in the same way.

The first cow was grazing in a field, and was seen to be restless the whole day, absenting herself from the rest of the herd and only occasionally grazing. As she was nearly a fortnight overdue to calve she was kept under observation. During the day there were no calving pains manifest, the cow only appearing dull and listless, but later in the evening she was found lying and unable to rise. The animal was of great size in the abdominal region, being very tense, and the rumen felt very full of ingesta. The respiration was accelerated, and with each expiration a painful grunt was emitted. The head was occasionally thrown from side to side, and she appeared to be suffering pain due to

the increased pressure of the abdominal contents on the heart and lungs. Externally the cow felt somewhat cold, but her internal temperature was normal.

I diagnosed that she was suffering from functional paralysis due to stoppage of the bowels. All cases of constipation in the cow past due to calve must be looked upon as serious, whether they are suffering from functional paralysis or not.

The rumen being greatly distended, I applied the trocar. Some gas passed through the canula, but not sufficient to appreciably lessen the size of the abdomen. I then administered *per orem* one drachm of nux vomica pulv., one ounce of ammon. carb., and four ounces of soda carb., in a quart of cold water.

The cow was ready to calve, the ligaments were relaxed—or, as it is termed here, "she was slipped"—so I thought it advisable to examine the condition of the os uteri. I lubricated my hand with soap and water and introduced it into the vagina. To my surprise I found the os uteri dilated, the amniotic sac, or water bleb, was protruding through the os into the vagina, and felt about the size of a child's head. Two of the calf's feet and fetlocks could be felt through the wall of the sac.

On consideration, I decided to deliver the calf instead of leaving it to nature. The sac was then burst and a cord attached to each fetlock, the loose ends being held by two assistants. The nose of the calf could be felt resting on the forelegs and coming properly into the passage. When traction was applied the cow now began with labour pains. I then bathed the external genitals with hot water and rubbed the soap in the form of a lather over the vulva and alongside the root of the tail. This is a good procedure, as it aids delivery by relaxing the skin and prevents tearing of the vulva, particularly in primipara. The calf was quickly delivered, but dead.

The cow was now given half a pint of whisky and four pounds of treacle dissolved in warm water. The placenta came away soon after the calf was born.

Although the case seemed hopeless, I thought I would try inflating the udder with air. This was done, and the teats tied with tape in order to retain the air in the udder. The cow was now turned on to her other side, and, the field being an incline, she was placed with her head up the hill so as to lessen as much as possible the pressure on her heart and lungs. Some sacks and a waterproof cart cover were put over her to keep her warm. The tapes were removed from the teats at the end of two and a half hours, for if left longer they are liable to

cause injury. The cow was kept lying on her sternum, and not on her side, as in the latter position she would become tympanitic. To avoid cramp the patient was turned on to her other side every two hours, if she had not already turned herself. A small bucketful of chilled water was offered to her to drink every half hour, and she was kept sheeted to prevent a chill and consequently a relapse. After four hours the cow was again drenched with four pounds of treacle dissolved in water. In eight hours the animal was able to rise, and was placed in a loose box. The painful grunt had gone, and the size of the abdomen had diminished, but the constipation was unrelieved. To overcome this two pounds of fat bacon was given. She was then dosed with nux vomica pulv. ʒi, ammon. carb. ʒi, soda carb. ʒi, followed by three pounds of treacle morning and night for three days. She was fed on soft food, only receiving two bran mashes the first day.

In the second case the history and symptoms were in every way similar to the first. So the same treatment was adopted with the same satisfactory results.

It may be suggested that these were only cases of "milk fever" before calving, but I never met with milk fever cases showing the same distension and hard fulness of the abdomen, and question the recovery of such cases without further treatment than inflation of the udder only.

All cases of constipation in cows due to calve must be looked upon as serious, and treatment must be immediate and energetic, even though the cow may not appear to ail much, though usually there is great depression and listlessness. In suchlike cases it would not be amiss to inflate the udder with air, although there is no collapse. In cases where cows are overdue and fully prepared to calve, though calving pains be absent, it is advisable to examine the os uteri.

The giving of fat bacon may be considered unscientific. Nevertheless I have found it very efficacious in cases of impaction, stoppage and paralysis of the bowels in cattle. The dose usually given is from two to three pounds, and is prepared as follows :—The bacon is weighed without any lean or rind, and cut into pieces about the size of half-inch squares. It is covered with water and brought to a boil and kept boiling for twenty minutes. It is now allowed to cool and administered to the patient by means of a horn.

A DESCRIPTION OF A CRYPTORCHID GOAT WITH ABNORMAL GENITALIA.*

By F. A. E. CREW and M. R. V. PANIKKAR.

Thanks to the courtesy of Mr. T. H. Gillespie, the Director Secretary of the Zoological Park, we have had the opportunity of making a thorough examination of a full-grown Anglo-Nubian goat, of unknown history, but which, during its life, had been recognised as being distinctly abnormal in the anatomy of its external genitalia and also in its sexual behaviour, at times acting like a male and at others playing the part of a female.

Fig. 1.—External genitalia.

On inspection, the external characters (Fig. 1) were of the female type. The vulva was normal in outline with thick labia and a sharp ventral commissure, but projecting therefrom there was a structure, 2·5 cm. long, which somewhat resembled the terminal portion of the penis of the male, bearing as it did the galea glandis, corona glandis tuberculum, and collum glandis. A prepuce lined with mucous membrane extended from the ventral commissure to the glands surrounding the collum glandis, and had attachments to the medium raphe on the anterior surface of the collum. Instead of the normal vertical vulval cleft there was an oval orifice situated below the dorsal commissure, and the vulval passage took a dorsal direction. There was no scrotum. The mammary glands were undeveloped, but two small teats upon hair-free areolæ were found in the usual position.

A medium incision was made in the abdominal wall and the gonads sought in the neighbourhood of the kidneys, but none were found. An incision was then made over the region of each external inguinal ring, and there the paired gonads were found in a situation posterior

* Paper from the Animal Breeding Research Department, University of Edinburgh.

to that of the mammary glands and lying in the sub-integumental fat (Fig. 2).

The Internal Genitalia (Fig. 3).—Each gonad had the form of an atrophic testis with tunica vaginalis, epididymis, and spermatic cord with its usual constituents, except that, incorporated therein, was an additional cord-like mass of tissue, which proved to be the anterior end of the Müllerian duct. The mesorchium included fat within its folds, and its attachment to the dorsal wall of the abdominal cavity could be traced. The surface of the testis in contact with the epididymis was noticeably flattened. The epididymis, with a relatively enlarged head and tail, was larger than the testis itself, and its constituent tubules could be seen on its surface; the ligament of the epididymis was also present.

Each *ductus deferens* took origin in the tail of the epididymis and passed forward along the posterior border of the spermatic cord, and,

FIG. 2.—The gonads *in situ*. Rt.—exposed; lt.—still enveloped in fat.

on emerging from the internal inguinal ring, passed into the genital fold towards the bladder. As they approached the bladder the two ducts came to lie in close apposition, forming distinct ampullæ for a distance of about 5 cm., while in that part of their course between the seminal vesicles there was an actual fusion of the adjoining walls. Thereafter the two ducts entered the wall of the vaginal part of the urethro-vaginal mass medial to the entrance of the ducts from the seminal vesicles.

Each *seminal vesicle* was small, and its surface was but slightly lobulated. They were situated on either side of the posterior end of

the ampullæ of the ductus deferens and projected as club-shaped masses towards the bladder from the region of the dorsal surface of the urethro-vaginal mass. From the caudal end of the gland several ducts passed to penetrate the dorsal wall of the vaginal part lateral to the termination of the deferens duct.

Bulbo-urethral glands were present, but each was so completely enveloped by the bulbo-urethral muscle that only a careful search could reveal it. Each closely resembled the seminal vesicle in size and shape, but there was a distinct curve in the long axis of the gland

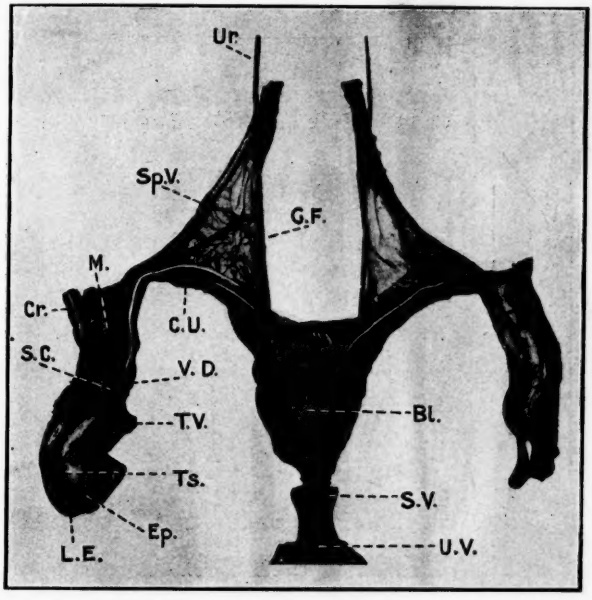

FIG. 3.—Internal genitalia (the left gonad has been removed for fixation).

Bl.	Urinary bladder.	S.V.	Seminal vesicles.
Cr.	Cremaster.	Sp. V.	Spermatic vessels.
C.U.	Uterine horn.	Ts.	Testis.
G.F.	Genital fold.	T.V.	Tunica vaginalis (laid open).
L.E.	Ligament of the epididymis.	Ur.	Ureter.
M.	Mesorchium.	U.V.	Urethro-vaginal mass.
S.C.	Spermatic cord.	V.D.	Vas deferens.

and the colour was venous. Each was contained within a thick fibrous capsule.

Müllerian Ducts.—In the spermatic cord of each side, close and anterior to the deferent duct, there appeared a cord-like mass of tissue, triangular on cross-section. It had a tapering origin from near the

tail of the epididymis, then it gradually thickened and became slightly flexuous. After passing inward through the internal inguinal ring it became flattened to a thick tape, 0.5 cm. wide, and continued along the anterior border of the genital fold till it joined its fellow of the opposite side at the median plane. For a short distance (2 cm.) at the beginning the cord was solid and had no lumen, but soon it showed a lumen which was widest at the region of the tape-like portion. The common mass produced by the union ot the two tape-like structures was of uniform size and shape, and extended only for a distance of

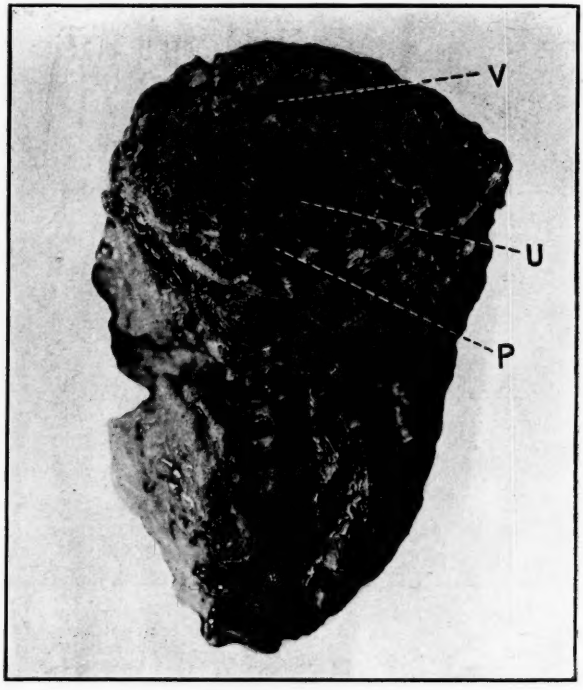

FIG. 4.—Cross-section of the urethro-vaginal mass.
V. Lumen of vagina. P. Pars disseminata of prostate.
U. Lumen of urethra.

1·5 cm., where it ended blindly in the genital fold. The part of the Müllerian duct described above perhaps represents the uterine tube, uterine horn and the body of the uterus. No continuation of the rest of the Müllerian duct in the genital fold was observed.

The *urethra* continued backwards from the neck of the bladder,

and was 0·5 cm. in diameter. At the level of the anterior end of the seminal vesicles it showed the characteristic ventral bend. The part extending backwards from this point was dorso-ventrally compressed. It gradually increased in width (2·25 cm.) and in thickness (1·5 cm.) till it reached the ischio-cavernous muscle and appeared to be only a continuation of the urethra, the dorsal surface being of a fibrous nature, while the ventral surface showed the urethral muscle. However, on cross-section in the middle of its length (Fig. 4) two lumini were seen, of which the ventral one was smaller and had the characteristic shape of the urethra, whereas the dorsal one was much larger and had an oval outline. Both were lined with mucous membrane. Around the ventral lumen there was a thick layer of glandular tissue, the pars disseminata of the prostate with the urethral muscle situated ventrally

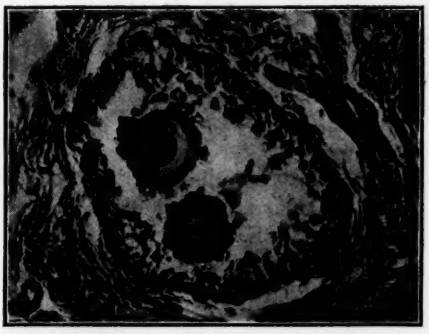

FIG. 5.—Section of gonad ×320, showing a seminiferous tubule with the ovumlike bodies.

and laterally on the outside. This mucous tube was continuous with that in the neck of the bladder, and had a posterior passage outside. Consequently, this part must be considered as the direct continuation of the urethra. It was obvious even to the naked eye that the wall of the dorsal lumen was composed of material differing from that of the ventral lumen. Anteriorly the lumen of the dorsal tube became narrower and ended blindly in the neighbourhood of the base of the seminal vesicles. Posteriorly it grew wider up to the terminal part, where it again narrowed and opened into the urogenital sinus. This was identified as the vagina; possibly it fused with the wall of the urethra during the embryonic stage, thus forming the common urethro-vaginal structure which, were it not for the examination of cross-sections, one could take to be the urethra. The wall of the terminal part of this became gradually thin and more fibrous.

Urogenital Sinus.—The terminal dilated part had longitudinal folds of mucous membrane, measuring about 2 cm. The openings of the deferent ducts, after passing through the urethro-vaginal mass, opened into the urogenital sinus about 0·75 cm. away from its formation.

Corpus cavernosum penis had the normal shape and appearance, and had the characteristic sigmoid curve, and, when fully extended, was 15 cm. long. The *Ischio-cavernous muscle* and *Retractor penis* were also present. The urethra was not incorporated in the terminal part of the corpus cavernosum penis, but, as has been stated above, opened into the urogenital sinus.

A microscopical examination of the gonad revealed several interesting features. Only the germinal tissue showed marked degeneration, the rest of the organ appearing comparatively normal.

The seminiferous tubules as seen in cross-section are mostly of irregular shape. Even in the less degenerate tubules the outlines of the epithelial cells are not clearly defined. In most cases the cells are loosened and spreading out into the lumen to form a syncitial network. No evidence of spermatogenesis could be found in any of the sections.

The most noteworthy feature of the testis is the presence of a number of deeply staining spherical bodies which occur in the lumina of the seminiferous tubules (Fig. 5). Each is invested by a layer of degenerate epithelial cells, the whole bearing a strong superficial resemblance to an ovum surrounded by a *corona radiata*. These bodies were found to be the products of a colloid degeneration of the germinal epithelium which were undergoing calcification.

The intertubular tissue is present in exceptionally large quantities and appears normal in histological features. Connective tissue predominates, though the interstitial cells are also numerous. The *rete testis*, *vasa efferentia*, and *epididymis* appear normal and typical.

The gonad is encapsuled by the usual fibrous *tunica albuginea*, which, in places, is split into two layers by intervening adipose tissue.

Closely associated with the testis in the region of the epididymis is a considerable venous plexus, the interstices of which are largely filled with adipose tissue. The substance of the gonad is richly supplied by a capillary system.

Somewhat similar cases have been recorded by C. J. Davies (VETER. JOUR., v. 20, p. 62, 1913) and by R. S. Stone (*China Med. Jour.*, v. 34, No. 6, 1920).

The points of interest in this case are as follows :—

(1) Bilateral imperfect descent of the testes with degeneration

of spermatogenetic epithelium and associated hyperplasia of the intertubular tissue.

(2) Abnormality of the accessory sexual apparatus and of the external genitalia of an intersexual kind; the sexual behaviour was not as that of a male, but varied, being male-like at times and female-like at others.

(3) The presence within the seminiferous tubules of bodies which very closely resembled ova in appearance, but which, on further examination, proved to be the results of colloid degeneration of the germinal epithelium with consequent calcification.

SOME UNTOWARD RESULTS FOLLOWING INOCULATION AGAINST PLEURO-PNEUMONIA CONTAGIOSA IN BOVINES.

By MAX HENRY, M.R.C.V.S., B.V.Sc.,
Government Veterinary Surgeon, New South Wales, Australia.

THERE recently occurred an outbreak of pleuro-pneumonia contagiosa of bovines in a dairying district in New South Wales, in which the results of protective inoculation were striking and unusual. The district in question had been comparatively free for some time, but in June last a mob of cattle were brought in from outside, sold at the local yards, and widely distributed throughout the district. The result was a somewhat extensive outbreak of pleuro-pneumonia, involving many small dairy herds and characterised by rapid onset of symptoms and death of most of the animals attacked. The outbreak was dealt with in the usual way by the district inspector, infested holdings and cattle being quarantined, the affected animals destroyed at once, or early destruction arranged for, and in-contacts inoculated. The actual work of inoculation was mostly carried out by the district inspector himself, but some herds were done by stockmen. The so-called "natural virus" was used for inoculation, being obtained by the following method:—An affected animal was selected, killed by shooting or stunning, and bled, care being taken not to sever the trachea. The animal was then placed head down hill, the abdominal cavity opened, and the diaphragm exposed. With a clean knife a perpendicular slit was made in the diaphragm on one side from just below the rim downwards, and with a small enamel cup, previously boiled, the fluid contained in the pleural sack was dipped out and poured into a previously sterilised bottle. The lungs and attached glands were then examined for tuberculosis. Providing the so-called "virus" appeared suitable, *i.e.*, fairly clear, of a straw colour, and without evidence of contamination, it was kept as cool as possible

under the circumstances (which could have been much better) and used as required to inoculate in-contacts. Several strains were used, mostly without any preservative, but for one herd 30 per cent. pure glycerine was added. The method of inoculation employed was to soak a number of sterilised threads of worsted 1 inch long in a little of the " virus " poured into a previously boiled porcelain jar. From this jar they were removed by sterile forceps as required, and threaded into the inoculating needle. This threading furnished a good opportunity for contamination. The long hair at the tip of the cow's tail was cut off with a knife and the needle carrying the worsted thrust through the soft tissues of the tail, ½ to 1 inch from the tip, the needle withdrawn, and the worsted left in position. At first the worsteds were made to take up as much fluid as possible, but later, owing to the results obtained, as little as possible, so long as they were damped by it. The results of this inoculation from the point of view of protection were all that could be desired, as careful investigation failed to show a single case in which the protection could be held to have broken down, but in other respects the results were peculiar, and in some cases alarming, and it is because these results were peculiar that the method of inoculation is given above in such detail.

It was because of these results that veterinary investigation was sought. The conditions noted on some of the farms were as follows :—

Farm A.—Two cows isolated for P.P.C. on 16/8/21. On 20/8/21 " A " inoculated nineteen contacts, but as on 1/9/21 there occurred a further case, " B," considering that " A's " virus might not have been satisfactory, re-inoculated. Two cows died from P.P.C., and two more were allowed to recover to be fattened off, and three tails were amputated. The tail of one cow commenced to swell seven weeks after inoculation, the swelling extending from 4 to 6 inches up the tail ; the tail was slit in two places, and discharged a clear, straw-coloured fluid. The swelling then ceased to progress. The tail became partly paralysed, but power shortly returned. Another case showed a swelling on the left side about 4 inches in diameter in the region of the anal gland.

Farm B.—Cattle inoculated by " B " on 25/8/21, using No. 1 virus ; four tails affected, one amputated close to the butt and two about 5 inches from the tip. The swelling in all cases commenced at the tip and extended upwards. The tails began to swell about twenty-one days after inoculation. On 3/10/21 a young bull showed a soft, fluctuating swelling in the region of the anal gland, which afterwards subsided.

Farm C.—No cases, but twenty-four head inoculated by " C " on 6/9/21, using No. 2 virus. Two cows and a bull died as a result of the

extension of the lesions of reaction up the tail and over the buttocks. In addition, four tails were amputated. In some of these cases the swelling occurred between the butt of the tail and the joint of the ischium. One case showed a swelling on the right quarter between the hip joint and sacrum, tense, but not hot nor painful ; no tendency to point, but causing some slight lameness on the part of the cow. In two cases on this farm the owner incised the swellings parallel in line with the backbone, pressed out as much of the clear straw-coloured fluid as he was able, and dressed with tar. These cases did well.

Farm D.—No cases. Twenty-six head inoculated on 25/8/21 by "B" with No. 1 virus. No untoward effect whatever. Setons removed seven days after inoculation.

Farm E.—Five definite cases of P.P.C. occurred on this farm, and twenty-six contacts were inoculated by "B" on 25/8/21 with No. 1 virus. Subsequent to inoculation eight animals died, but none were cases of natural P.P.C. In the animals which died the tails became considerably enlarged, and the swelling involved the region of the perineum, the butt of the tail, and the area between the point of the ischium and the hip joint. In some cases defæcation and urination were interfered with.

Farm F.—No cases. Thirty-one animals inoculated by "B" on 30/8/21 with No. 1 virus. Three tails amputated. In two the swelling commenced at the tip and in one alongside the butt.

Farm G.—No cases. Twenty-four animals inoculated by "B" on 30/8/21 with No. 1 virus. Three animals died as a result fourteen days after inoculation, and it was necessary to amputate fourteen tails. Of these the swellings in four commenced at the tip, and in the remainder about the butt of the tail. In some the swellings were incised and clear straw-coloured fluid expressed.

Farm H.—No cases. Twenty-four animals inoculated by "A" on 27/8/21. One animal died subsequently with enlargement of tail and buttocks. Three tails amputated and tips removed from eight others as a precautionary measure.

Farm I.—Obscure history here. Two animals which were being agisted on the place, one of which came from a farm subsequently found infected with pleuro-pneumonia, died almost certainly from P.P.C. In consequence of the general scare a month later (29/8/21) forty animals were inoculated by "A" with No. 2 virus. No deaths followed, but six tails were amputated, two close to the butt.

Farm J.—No cases, but the cows drank from the same trough as those of Farm I, on which P.P.C. had almost certainly occurred. Thirty-five animals inoculated by "A" on 29/8/21 with No. 2 virus. As a result, four died, three were very seriously affected, and recovery

was improbable when last seen, and nine tails were amputated. The first swellings were observed about fourteen days after inoculation in most cases, commencing round the butt of the tail.

Farm K.—Fifty animals inoculated by "A" on 5/9/21 with No. 2 virus. No ill-effects whatever.

Farm L.—No cases. Twenty-six animals inoculated by "A" on 29/8/21 with No. 2 virus. Two tails slightly affected were amputated. One cow exhibited diffuse swelling of the hind quarters, extending downwards to the udder. This swelling largely disappeared, but there remained a circumscribed somewhat soft swelling in the subcutaneous tissue about three-quarters up the udder on the right side. The bull swelled considerably over the buttocks and thighs, but recovered, with the exception of a very small lesion in the right anal fold.

Farm M.—One case at least. Twenty-five animals inoculated by "B" on 22/8/21, using virus No. 3. None died after inoculation. In three cases the tip of the tail for about three inches up swelled.

Farm N.—Eighteen animals inoculated by "A" on 6/9/21 with No. 2 virus. One died as a result of inoculation and three tails were amputated, but only one case was of any severity.

Farm O.—Sixty inoculated by "B" and forty by "A," No. 2 virus being used. One cow died, two tails amputated. In one case swelling commenced at the butt and in the other at the tip.

One point of particular interest in this outbreak is the varying reaction displayed by different herds under similar conditions.

The following table will make this clear, as it shows the results with each strain of "virus" used :—

Virus.	Taken.	Used.	Herds inoculated with.	Inoculated by.	Result.
No. 1 ...	24/8/21	25/8/21	Farm B. (19)	B	A3
		25/8/21	Farm D (26)	B	—
		25/8/21	Farm E (26)	B	D8
		30/8/21	Farm F (31)	B	A3
		20/8/21	Farm G (24)	B	A14
					D3
		5/9/21	Farm K (50)	A	—
No. 2 ...	29/7/21	6/9/21	Farm C (24)	C	D3
					A4
		27/8/21	Farm H (24)	A	D1
					A11*
		29/8/21	Farm I (40)	A	A6
		29/8/21	Farm J (35)	A	D4†
					A9
		29/8/21	Farm L (26)	A	A2*
		6/9/21	Farm N (18)	A	D1
					A3*
		——	Farm O (60)	B20	D1
				A40	A2
No. 3 ...	12/8/21	22/8/21	Farm M (25)	B	—

D Deaths. A Amputations. * Slight cases. † Three more likely to die. Numbers in brackets indicate number in herd.

Now what is the probable explanation of this variability? Take virus No. 1. On the same day the same operator, "B," used this virus on three farms. On one (E) eight cattle died subsequently as a result of inoculation; on the second (B) three tails were amputated; on the third (D) there were no untoward effects whatever. The numbers of cattle were 26, 19 and 26 respectively. One point may be mentioned: the standard of management on (D) is high, on (B) average, and on (E) low. At that time the virus was fresh and presumably comparatively uncontaminated, yet on 5/9/21, when any contamination present must have increased, it was used on (C) herd of 50 by another inoculator, "A," with no ill-effect.

Is it to be assumed that in this case the method of inoculation was at fault? This cannot be held, as "A," in a series of herds done by him with No. 2 virus, had even more disastrous results than "B."

In searching for the cause of the mortalities and other ill-effects, it may be said that what in Australia have been so largely considered the causes of untoward results of inoculation against pleuro-pneumonia contagiosa were entirely absent.

For instance, it is widely held that contamination of the inoculating fluid by pyogenic and other organisms is largely responsible. Not a single instance could be observed in this outbreak which would substantiate that view. Pus formation was markedly absent; in fact, considering the nature of some of the raw surfaces and deep wounds, pus formation was astonishingly absent.

It may be mentioned that Wallis Hoare ("System of Veterinary Medicine") says: "If the lymph be contaminated, excessive swelling, necrosis of the tail, and even pyæmia may result," but makes no mention of untoward sequelæ apart from this. Hutyra and Marek ("Special Pathology and Therapeutics of the Diseases of Domestic Animals") state that: "The cause of these dangerous complications may almost invariably be attributed to the fact that the vaccine contained foreign pathogenic bacteria, or that such organisms entered it during its preparation and preservation, or during the inoculation."

A second widely held theory is that injury to the caudal bones induces necrosis and subsequent sloughing. Unquestionably injury to the caudal bones might so act, but such action was conspicuously absent. Necrosis of the soft bones was undoubtedly present, but such necrosis was, whenever seen, secondary to the real cause of the pathological changes, and was not due to any bone injury.

The cause of the swelling, whether in the tail itself or elsewhere, was the introduction into the system of a highly virulent strain of the causal organism of pleuro-pneumonia contagiosa, and the deaths following inoculation were due to the same cause; and it is strongly

suggested that the variability of result shown is to be almost, if not entirely, looked upon as due to the after management of the cattle. Many cases were examined both ante and post-mortem, and in all a similar appearance was observed. The skin, except where as a secondary result it had become necrotic, was normal, the tissues immediately subcutaneous were œdematous, the connective tissue mesh holding a clear, straw-coloured exudate. The deeper connective subcutaneous tissue was greatly thickened, and presented a firm appearance, showing broad white strands of tissue surrounding globules of exudate, the whole having a striking resemblance to a typical pneumonic lesion as seen in pleuro-pneumonia contagiosa, with the place of the actual lung tissue taken by the fluid globules, and with far smaller lobulisation. The muscle tissue itself was normal. In some cases the œdematous condition in the immediately subcutaneous tissues extended forward for some distance further than the thickening of the connective tissue, even so far as to encroach on the region over the lumbar vertebræ.

The reaction to inoculation, although so violent, was in some cases markedly retarded, for whereas the majority of reactions were evident within three weeks after inoculation, in some it was delayed until six or seven weeks had elapsed. This would suggest that the quarantine periods enforced against pleuro-pneumonia require revision, as cases such as many of those seen would be virulently infective.

The age of the material used for inoculation might well have led to suspicion in the series of herds inoculated with No. 2 virus, but the results therein were no worse than at farms (E) and (G), where inoculation was carried out with material one and five days respectively after it was taken from the living beast. The lapse of time, *i.e.*, nearly six weeks in some cases, between obtaining and using the material evidently made no difference in its virulence.

Although the primary cause of the loss and injury was the introduction of virulent pleuro-pneumonia organisms, other factors must be considered as secondary causes: Firstly, the fact that the majority of the animals inoculated were dairy cows, and many were in full milk. That fact involved two trips daily for the animals from the paddocks to the bails, and in places where management and care of stock were not too good certainly involved some knocking about and probably tail twisting, and this treatment, coupled with the travelling of animals in a mild state of fever, is considered very largely responsible for the untoward results obtained.

Farm (K) was occupied by dry cows and steers; after being inoculated they were left severely alone. Farm (D) was owned by a very

good stock manager, who carefully removed all the setons at the end of a week, and whereon the cows were subjected to no rough usage.

Recent experience tends to confirm the opinion that it would be difficult to get a more accurate clinical picture of the results of inoculation against pleuro-pneumonia, and a sounder view of the causes leading to untoward results, and the circumstances which should influence the decision to inoculate individual animals may be found in the various articles and addresses of Rutherford, an Edinburgh veterinarian of the eighties of last century. His conclusions will be found fully set out in the various issues of THE VETERINARY JOURNAL of that date, and are quoted by Williams in his "Principles and Practice of Veterinary Medicine." It is interesting to note that he does not hesitate to acknowledge his indebtedness to Graham Mitchell, of Victoria, a veterinarian to whom sufficient credit is not given for his work on behalf of this country.

Abstracts.

TUBERCULOSIS AND THE ACCREDITED HERD PLAN IN CANADA.*

THE accredited herd plan for the eradication of tuberculosis from pure-bred herds was put in operation in September, 1919. The breeders of Canada have welcomed it as a practical method of cleaning up diseased herds and for giving official recognition to herds free from tuberculosis. Applications to have tests of herds made by our inspectors are so numerous as to keep the staff extremely busy.

Extreme care is taken to ensure the accuracy of the tests. Our inspectors are instructed to relax no effort to this end, consequently it may sometimes appear that an unnecessarily long time is spent in making tests. It is true that in many cases, and, in fact, in the majority of cases, reactions are shown in a certain definite number of hours. On the other hand, there are a certain number of cases in which the reaction is delayed and appears at an hour when tests as ordinarily made are often completed. We endeavour to detect these "late" reactors as well as the others.

The cleaning up of an infected herd is not a simple matter, but a task demanding a high standard of veterinary skill and much patience and persistence. The initial test may reveal 20 per cent. reactors. These are removed and slaughtered and the premises are carefully disinfected. In sixty days our inspector retests the herd and finds from 2 per cent. to 5 per cent. reactors which had passed the first test. We always expect to find some more reactors in such a case. The

* Report of the Director-General for year ending March 31, 1921.

herd which shows 20 per cent. reactors is badly diseased and contains animals in all stages of disease, advanced "open" cases, moderately diseased cases, and incipient cases of recent infection.

Experience proves that in the advanced case and also in the incipient case the tuberculin test may fail. The disease may progress to such a point that the animal is immune to tuberculin, or the disease may have had no time to develop as yet and the amount of tuberculous material in the animal is too slight to cause a reaction to tuberculin.

Both the early and the late case of tuberculosis may escape detection by a single test, but by repeating the test at suitable intervals the early case will eventually react.

The advanced non-reactor is a more difficult problem. Sometimes a physical examination may expose it. Sometimes the combination of two or more methods of testing such as the so-called triple test will reveal it. But occasionally the advanced case may survive several tests and remain in the herd to prolong the existence of the infection.

Fortunately such cases are not frequent, but when they occur they may prevent the eradication of tuberculosis from a herd for an indefinite time.

The return to the cleaning up of a herd after two or more tests of the herd, it finally passes a clean test without reactors. It might now be supposed that nothing remained but to await the time for the final test a year later, when, if a clean test were obtained, the herd could be fully accredited. Unfortunately for this supposition, the owner of the herd wishes to make up for the losses he has incurred by adding to his herd some fresh animals. These must be tested and pass the test before he can be permitted to bring them on to his farm, and then they must be kept in isolation for sixty days and retested before they can be added to the original herd.

This adds very greatly to the work of our inspectors, and as we advance will still further impede our progress. We appear to be dragging a chain which lengthens at every step. Relief will be in sight when we have a list of fully accredited herds from which purchases can be made, and when the time arrives for turning over the herds which have been fully accredited for one year to the future control of the approved practitioner.

Translations.

FOOT AND MOUTH DISEASE IN MAN AND ANIMALS IN OLDENBURG.

By SCHLÄGER.

SCHLAGER'S report to the Medical Society of Oldenburg states "that 60 cases of transmission of foot and mouth disease to man were established. It led to grave general disturbance of health, high fever, with typical lesions on the mouth, hands and toes. These facts prove that there can really be a transmission of foot and mouth disease to man. Transmission took place by unboiled milk and by direct contact with ailing subjects."

The liability of man to infection from foot and mouth disease is small, for in 1920 there were 10,000 farms involved in outbreaks of foot and mouth in Oldenburg.—*Revue Gén. de Méd. Vet.*

FOOT AND MOUTH DISEASE IN BIRDS.

By BECKER.

BECKER has observed on different occasions that the poultry of the farm have been affected with aphthous fever where the cattle have been ill from foot and mouth.

The aphthæ are very small and are generally seen on the upper edge of the nostrils. Aphthæ of the comb and the wattles are rare; they are exceptional on the feet, the digits and the articulation of the digits. In aquatic birds the lesions are chiefly situated on the interdigital membranes and on the buccal and pharyngeal mucosæ. The vesicles rupture in a few days and are followed by little erosions and ulcers apt to impede walking and to provoke anorexia and slight general ill-health.

The affection must not be confounded with avian diphtheria characterised by quite different lesions chiefly situated in the respiratory organs. Ulcers and erosions disappear in 8 to 15 days and never cause death. On affected farms foot and mouth of cattle almost always reaches the fowls; isolation of these animals being hardly practicable and fowls have the habit of pecking at the dung and getting into the mangers and courts.—*Revue Gén. de Méd. Vet.*

G. M.

PROTECTION OF THE TITLE VETERINARY SURGEON IN FRANCE.

AN alteration in the law which has been proposed in France, and is likely to be carried, deals with the protection of the qualified veterinary surgeon. The following is an account of what is proposed:—

Professional titles, regularly acquired as a result of controlled

studies, do not benefit in actual legislation, generally and with few exceptions, from a protection surely supported by penal sanctions Without doubt the professions of chemist, herbalist, dentist, midwife, and doctor are regulated and their illegal exercise is repressed.

More recently the law of August 2, 1918, has forbidden the usurpation of the title of engineer agriculturist, and agricultural engineer, under the sanction of penalties outlined in Article 259 of the Penal Code. But whoever can say that an architect or engineer without having the diploma and without this usurpation, troublesome and often injurious, may be punished. In a different professional class the title of lawyer has quite recently been defined and the right to carry it been reserved by decree of June 20, 1920, but no sanction has been provided against its usurpation.

It is, however, of general interest that professional titles to which the public give credit are reserved, under the sanction of repressive laws, to those who have acquired by controlled studies the right to carry them. How can it be admitted that the title of engineer agriculturist or agricultural may only be protected by legal sanctions when whoever in calling himself an engineer or architect can capture the confidence of the public which is not due very often without this title ?

PROPOSITION OF THE LAW.

Article 1.—Nobody must make use of a professional title who has not fulfilled the legal conditions required for carrying it.

Article 2.—The usage of the professional title of engineer and architect shall be regulated by a decree carried in the Council of State on the advice of professional sections regularly constituted.

Article 3.—A paragraph as follows shall be added to Article 259 of the Penal Code :—" Shall be punished with the penalties named in the first paragraph of the present Article whoever shall make use of a professional title without fulfilling the conditions legally required for carrying it."

Amendment.—In Article 2, after the word " *architect* " add " *and veterinary surgeon.*"

Summary Explanation.—The protection of the title veterinary surgeon is quite as important as that of all other professional titles.—*Recueil le Médecine Vétérinaire.* G. M.

REMARKS ON SOME SITUATIONS OF CANCER IN ANIMALS.

BY M. CADIOT.

THE proportion of malignant tumours as disclosed on post-mortem is four per thousand in the horse and eighteen per thousand in the dog. Of 10,000 horses of all ages and service there is an average of

ten cancerous, four or five subjects affected with epithelioma, and five or six with sarcoma ; of 10,000 dogs, sixty-two are cancerous, fifty affected with epithelioma, and twelve with sarcoma. Abattoir statistics on 272,204 horses taken by Dr. Morel show 242 malignant tumours. At Limoges cancer statistics in bovines during a period of twelve years showed sixty-five cases, or a proportion of one per thousand ; sixty-one of these cases were in old or adult animals and four in young beasts. At Chicago in over two million cattle examined there were forty-nine cases of external cancer, and, singularly enough, all these were epitheliomas of the lachrymal caruncle.

In herbivora, as in flesh eaters, cancer has a constant predilection for aged individuals and for tissues where the organs lessen in their resistance from senile involution. During the period of growth it is hardly observed. It becomes more common at adult age ; then its frequency increases with years, whether it be sarcoma or epithelioma, the latter especially becoming more prevalent in old age.

If cattle in certain countries show a smaller proportion of cancer than the horse it is because they are seldom kept up to the age of high frequency of cancer. The identity of these tumours in man and animals is believed to be similar. They, however, seem to exert a less harmful effect on the general health of an animal than in man, as also on nutrition. Even voluminous and generalised cancers in animals are rarely accompanied by cacluxia. Striking points are the frequency of cutaneous epithelioma in the dog and its rarity in other species ; the prevalence of cancer of the penis and sheath in the horse and ox and its rarity in the stallion and bull ; the frequency of mammary cancer in the bitch and cat and its rarity in other species, above all in the cow ; the frequency of cancer of the jaws in the horse and its rarity in other animals.

One of the most striking things is that *in animals, whether carnivora or herbivora, cancers of the digestive tube are rare and of exceptional rarity are those of the lips, tongue, œsophagus, stomach, and rectum ; equally rare is cancer of the uterus in female animals.*

Cancer of the œsophagus has only been observed three times : once in the horse, once in the mule, and once in the cat.

Cancer of the stomach is rare in all species of animals save the horse, where eight cases were found out of 330 primitive cancer cases examined. Here it is generally a gravimental epithelioma developed in the white mucosa, and affecting sometimes the inferior part of the œsophagus, the gastric mucosa proper being generally quite free.

Cancer of the rect. m, the most frequent of the intestinal cancers of man, is much more rare in animals. Only one authentic case in the horse has been noted in 30 years. We have never seen it in the dog.

Cadiot considers that cancer due to repeated irritations or traumatisms does not occur in animals. From natural ingesta and irritative and traumatic material the digestive tube of animals is very prone to harm, but cancer of the tongue, lips and digestive tube is quite rare.

Cancer of the stomach is attributed principally to œstrus larvæ irritation, and this is doubtless so, but the proportion of cases to animals affected with œstri is very small.

Cadiot also questions whether certain authors do not attribute too great importance to external traumatic influences in the production of epithelioma. The horse from mechanical irritation, the draft dogs from the harness, and the cow from milking are all subject to these influences, but the incidence of epithelioma is comparatively very rare.

Cancer of the penis and sheath are relatively frequent in horses, and geldings are almost exclusively affected—fifty-one out of fifty-two cases observed. Castration causes inertia of the penis and atrophy of the organ and its envelope ; there is no natural cleaning of the penis and its sheath ; dust and dirt get into it, the sinequia putrefies ; a gelding may make water into his sheath, and all sorts of irritants are used to make a horse make water, and so he becomes susceptible to cancer.—*Recueil de Med. Veterinaire.* G.M.

Reviews.

THE LIFE OF PASTEUR. By RÉNÉ VALLERY-RADOT. Translated by MRS. R. L. DEVONSHIRE, with introduction by SIR WM. OSLER, Bart., M.D., F.R.S. Published by CONSTABLE & CO., LTD. Price 10s. 6d. net.

THIS book is one of the most fascinating biographies of science which has ever been written, and should find a place on every veterinary surgeon's bookshelf, especially as it contains details of the wonderful discoveries which led up to the measures to be taken for the eradication of such animal scourges as anthrax and rabies, measures in which our French veterinary colleagues took such a large part, their names receiving full credit.

The names of Chauveau, Delafond, Bouley, Nocard, Arloing, and many others which are honoured as household words in veterinary science, figure largely throughout the book as collaborators with the great master, in conjunction with such learned contributors to science as Metchnikoff, Roux, Chamberland, Calmette, Virchow, Kitasato, Behreng, Yersin, Lister, Paget, and hosts of others.

Throughout the whole book credit and honour are given freely and generously to whomsoever they are respectively due, and the value of unselfish collaboration between scientists of all professions was never more clearly demonstrated or freely acknowledged than in these pages. The author has a wonderful gift in the way the work done is

presented to the readers of the book, and the translator, too, has done her work perfectly.

To pick out any particular page as being of more interest than another would be invidious, and in fact impossible. Every page has on it facts of value, and the whole, classified together, forms a groundwork of science upon which the student, whether medical or veterinary, could build a life's career of such enthusiasm and such usefulness as could not fail to lead to success and fame.

The name and fame of Pasteur will last as long as the world exists, and no better or cleverer description of the Great Master has ever appeared—which illustrates it more clearly, more enthusiastically, and yet with such modesty and truth, as the book we are reviewing. It is fascinating from beginning to end, and can be picked up and read in odd moments again and again, being equally of value to the youngest graduate and the oldest veterinary practitioner.

NOTES ON MANGE AND ALLIED MITES, FOR VETERINARIANS. By A. W. NOEL PILLER, F.R.C.V.S., F.Z.S. Published by BAILLIERE, TINDALL & COX, London. Pages, 108; 68 Illustrations. Price 12s. 6d. net.

IN a small volume of some 100 pages, amply illustrated, that well-known veterinary parasitologist, Mr. A. W. Noël Piller, has grouped together a collection of mange and allied mites of equal interest to the student and the practising veterinarian. The drawings and illustrations are largely original, many of the specimens being obtained as the result of the author's perseverance and research under the trying conditions of service in France during the Great War, and their clearness of detail and ampleness of description should prove a great attraction. As a teacher it is evident that the author has the student classes in his mind when writing, and the tables and descriptions are set forth in as simple a form as possible; and in no other work of the kind are the forage acari, which occasionally give rise to such irritative properties, so fully entered into. For the student coaching for an examination on the subject of external veterinary parasitology, the book is distinctly useful, and there is no doubt that it fills a gap in veterinary literature. The publishers have done their part well, and the book will find a ready sale.

POULTRY DISEASES. By B. F. KAUPP, M.S., D.V.M., Pathologist and Poultry Investigator, Experimental Station of the Department of Agriculture, North Carolina, U.S.A. Pp. 240; 80 Illustrations. Published by The American Veterinary Publishing Co., Chicago. Price 12s. 6d. net.

THE ANATOMY OF THE DOMESTIC FOWL. By the same author. Pp. 353; 84 Illustrations. Published by W. B. Saunders Company. Price 18s. net.

THE Economics of Poultry, and their profitable management, have of late years occupied quite an important place amongst the methods by which an out-of-door livelihood can be obtained; and, as a consequence, the diseases of fowls have been brought into public prominence.

Naturally, the veterinarian, as being the proper man to whom

application should be made in cases of illness, has also become interested, and in some districts a study of ovarian diseases has become an absolute necessity. To those who wish to be up to date in this branch of the profession the pioneer work done by Dr. Kaupp has been a godsend, and his books have filled a long-felt gap.

His work on the anatomy and physiology of the domestic fowl is invaluable for the student, embracing, as it does, chapters on Embryology, the ductless glands, the respiratory and digestive apparatus, the osseous, muscular and nervous systems—in fact, the whole structure—whilst no practitioner can afford to be without his work on Poultry Diseases. Both books display the scientific and persevering character of the author, whose name is well known and respected in America as a former teacher in one of the largest veterinary colleges, and in making a speciality of the study of such a comparatively lowly and neglected object as a common fowl he has rendered a service to his profession and to the economics of agriculture for which his veterinary *confrères* owe him a deep debt of gratitude.

NOTICES.

All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C.2. Telephone: Gerrard 4646. Telegrams: "Baillière Rand, London."

Letters for the JOURNAL, literary contributions, reports, notices, books for review, exchanges, new instruments or materials, and all matter for publication except advertisements) should be addressed to the Editor.

Manuscript—preferably typewritten—should be on one side only of paper marked with full name of author.

Illustrations for reproduction should be in good black or dark brown ink on white paper or card.

Copy for advertisements should be in the hands of the publishers—Baillière, Tindall and Cox—not later than the 25th of the month, or if proof is required not later than 23rd.

Annual Subscription, 21s. ($4.50 U.S.A. currency) post free.